

OBER 1, 1918

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AVIATION AND AERONAUTICAL ENGINEERING



British Observation Balloon over the Italian Front.
British Official Army Feature Photo Service.

VOLUME V
Number 5

SPECIAL FEATURES
BY
LIMIT PERFORMANCE OF AIRPLANES
SOME NEW ENEMY AIRPLANES
THE CLIMB OF AN AIRPLANE
COST OF AIR MAIL SERVICE
SYNTHETIC GASOLINE

Two
Dollars
a Year

PUBLISHED SEMI-MONTHLY

BY
THE GARDNER-MOFFAT CO., Inc.
120 WEST 32nd ST. NEW YORK

Entered as second-class matter, August 5, 1916, at the
Post Office at New York, N. Y., under act of March 3, 1879



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Hall-Scott L-6 Engine Shows Remarkable Test Record

In test runs at the Dayton Engineering Laboratories (Delco) with a Hall-Scott, six cylinder, L-6 Airplane engine, the average b. h. p. developed was 212.6 at 1660 r. p. m. This engine, mounted on the test stand, 502 lbs., or 2.45 lbs. per b. h. p.

The well known Hall-Scott L-6 engine, with a weight 412 lbs. per b. h. p., is still a record holder. The L-6 is a leader in showing marked development advance.

HALL-SCOTT MOTOR COMPANY
1000 Washington, D. C.



Now— All Together!

NOTHING could stand against the mad dash of the French and American cavalry on the Marne—the German lines gave way, broke, fled; the day was won. That fighting spirit of the men of Foch and Pershing, that united purpose—for Victory—must be the spirit, the purpose, of each of us behind the lines.



We must lead as well as they fight. And we must pull together with all the strength we have—*now!*

We must so order our lives that we can hang—to the limit—and last—to the limit—for Victory. We must put America's whole strength behind our fighting men.

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Let us lend the way they fight

Let us buy bonds to our utmost



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1913*

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What are you going to do for the Fourth Liberty Loan?

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Now that Victory is drawing, we are more than ever grateful for the share that has been given to the thousands of Standard workers in equipping America's aerial forces and hastening the coming of the new era.

STANDARD

A REAL FIGHTING INDUSTRY!

THE WHITE HOUSE

Again, the Government comes to the people of the country with the request that they lend their money, and that it offer to them direct credit that was before, in order that it might care for the rights of America and the balance of the world may be preserved with an unswerving eye to a national conclusion that it makes the effort with the greatest confidence because it knows that every day it is becoming closer to closer to thinking and throughout the nation that the economy of the war is an inevitable circumstance. The money that is here has been sent to the people and the value of the war is not open and the regular market of Germany are permitted to distribute that America may not buy at all. Now in America, however, have given the first market was distributed that that have and there for. Now to the construction and maintenance of the great pumpkins and efforts for which the Government was not up. They will not feel here to show the world for what that market was intended.

Archibald Hill

THE WHITE HOUSE

WASHINGTON, D. C.



Pilots cannot guess

They must know—every instant they are in the air—the exact temperature of their motors.

That is the reason for the universal use of the Boyce Moto-Meter upon American war-planes.

It tells the pilot the exact motor temperature at all altitudes, regardless of extremes of weather or climate; it registers accurately every degree from boiling to freezing.

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NEW YORK



BOYCE MOTO-METER

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3000 "	2 3/4" "	20	1000 "	3 1/2" Hexagon	20
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20000 "	1 1/2" "	20	1000 "	3 1/2" "	20
1000 "	1 1/2" "	20	1000 "	3 1/2" "	20
34000 "	1 1/2" "	20	1000 "	3 1/2" "	20
28000 "	1 1/2" "	20	1000 "	3 1/2" "	20
30000 "	1 1/2" "	20	1000 "	3 1/2" "	20
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9000 "	1 1/2" "	20	1000 "	3 1/2" "	20

HOT ROLLED 3/16" NICKEL 22 to 24 CARBON					
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We are prepared to reduce any of the Hot Rolled Items to a smaller size. We can "Rough Turn" or "Turn and Polish."

COLD DRAWN "ACME" FREE CUTTING SCREW STOCK					
Quantity	Size	Quantity	Size	Quantity	Size
5700 lbs.	1 1/2" Round	10000 "	2 1/2" Round	30000 lbs.	1 1/2" Round
2100 "	2 1/2" "	18500 "	2 3/4" "	85000 "	1 1/2" "
13000 "	2 3/4" "	7000 "	3 1/2" "	4000 "	2 1/2" "
30000 "	3 1/2" "	41000 "	3 3/4" "	10000 "	2 3/4" "
8100 "	3 3/4" "	30000 "	4 1/2" "	30000 "	3 1/2" "
51000 "	4 1/2" "	40000 "	5 1/2" "	15000 "	3 3/4" "
1400 "	5 1/2" "	2000 "	6 1/2" "	10000 "	4 1/2" "
50000 "	6 1/2" "	31000 "	7 1/2" "	30000 "	5 1/2" "
19000 "	7 1/2" "	35000 "	8 1/2" "	4000 "	6 1/2" "
10000 "	8 1/2" "	7000 "	9 1/2" "	10000 "	7 1/2" "

"ACME" FREE CUTTING SCREW STOCK					
Quantity	Size	Quantity	Size	Quantity	Size
20000 lbs.	2 1/2" Round	10000 lbs.	2 1/2" Round	10000 lbs.	2 1/2" Round
12000 "	2 3/4" "	3000 "	3 1/2" "	20000 "	2 3/4" "
20000 "	3 1/2" "	2000 "	4 1/2" "	10000 "	3 1/2" "
12000 "	4 1/2" "	10000 "	5 1/2" "	10000 "	4 1/2" "
20000 "	5 1/2" "	10000 "	6 1/2" "	10000 "	5 1/2" "
700 lbs.	2 1/2" Round	2100 lbs.	1 1/2" Round	1000 lbs.	1 1/2" Round
1800 "	2 3/4" "	7700 "	2 1/2" "	4000 "	1 1/2" "
5000 "	3 1/2" "	3000 "	3 3/4" "	6000 "	1 1/2" "

All of the material listed above offered subject to prior sale from our Cleveland warehouse. The only orders that are still uncertain as to whether or not to be placed, those require the material for the first three items. We are not sure of the quantity of the material for the first three items. We are not sure of the quantity of the material for the first three items. We are not sure of the quantity of the material for the first three items.

The Betz-Pierce Co.
Cleveland, Ohio

CHICAGO DAYTON DETROIT INDIANAPOLIS PITTSBURGH



Dollars that Fight

By SENATOR HENRY CABOT LODGE

The war will be won by men and ships, by guns and airplanes. To raise armies and supply them, to build the navy and support it, and to launch ships and transport, we must have money in large amounts. The expenditures of the Government for the ensuing year are estimated at \$2,000,000,000, a sum which baffles the imagination to conceive. That vast amount must come

one-third from taxes and two-thirds from loans. The success of the Fourth Loan, like those that preceded it is, therefore, absolutely necessary. We must work with the highest speed, as if the war was to end in six months. We must prepare in every direction, as if it was to last for years. Speed and preparation are both expensive.

Without the Loans We Cannot Have Either

We are fighting to secure a just, righteous and lasting peace. To a complete peace we must have a complete victory. It must not be a peace of bargain or compromise. The peace which satisfies Germany can never satisfy us. No peace that leaves Germany in a position to renew the war again will be worth having. It will be far from sufficient to give all our allies and the Western Allies—Belgium, France, Greece, Italy, Greece, the President with wisdom and foresight and great heart expressed his determination to reduce Russia. Russia must not be left in Germany's hands.

That would mean another war. Poland must be free. Her republic must be established in her due way between Germany and the East. Serbia and Roumania must be reconstituted. All these things are essential. Victory will bring them but complete victory and a peace dictated by us and our allies. It is a conflict of ideas. It is the principle of evil arrayed against the principle of good. It is the battle of freedom and civilization against barbarism and tyranny. We must win and we shall win.

We Cannot Win Without Money, and, Therefore, These Loans Are Vital, and the Country Should Rally in All Its Strength and Subscribe and Oversubscribe the Fourth Loan

Buy Bonds to Your Utmost!

This Space Contributed to Winning the War by
SPERRY GYROSCOPE COMPANY, BROOKLYN, NEW YORK

Accuracy-



A DEPARTMENT
OF YOUR PLANT
FOR

Valves

Propeller Hub Bolts

Push Rods

Turn Buckles

THE slogan of our grinding shops is "accuracy." When existing machines would not give close enough results for certain operations we invented new machines.

To get greater accuracy in truing our grinding wheels we devised entirely new truing apparatus. We aim to make our products in every way worthy to enter into the construction of yours.

No chance enters into our grinding department. Every dimension of your special valves, bolts, screws and other parts is accurately finished—gauged—KNOWN.

The Steel Products Co.

Michigan Plant
Detroit, Mich.

Main Plant
Cleveland, Ohio

Metals Welding Plant
Cleveland, Ohio



Rout 'em Out!

That's what Pershing's men are doing to the Huns. Not just stopping 'em, but chasing 'em—cleaning them out like rats from the house. The Americans are fighting with their whole souls.

That's the way to Fight

When you mean to win—rout 'em out! Go get every dollar you can afford—yes, and more—to lend the good old U. S. Government to back up Our Boys in the fight. Rout 'em out! Not only your own dollars, but rout out every man, woman and child you know and make them buy Liberty Bonds.

Buy Liberty Bonds to Your UTMOST

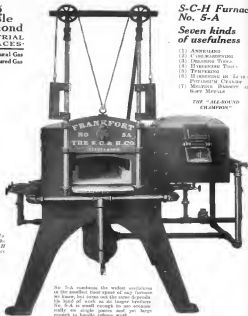
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EYEGLASSES**

STRAUSS & REISELSEN
Flour, Bakers, Sole Proprietors
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For Oil, Natural Gas
or Manufactured Gas



Send for catalog No. 5-A describing full line of S-C-H furnaces—a furnace for every purpose.

No. 5-A combines the widest application in the smallest foot space of any furnace we know, but does not the same to produce the best of work as do larger furnaces. No. 5-A is small enough to use economically on single pieces and yet large enough to handle volume work.

The two zones and melting pot are served by separate burners working under pressure at each zone. A high or low temperature can be secured which makes it suitable for high speed steel. The melting pot will hold about 25 pounds of steel or bronze, and the temperature may be obtained and held. Write for detailed specifications.

THE STRONG, CARLISLE & HAMMOND CO.
FRANKFORT AVENUE CLEVELAND, OHIO

Branches: New York Chicago ←—BRANCHES—→ Philadelphia Detroit Pittsburgh

S-C-H Furnace No. 5-A

Seven kinds
of usefulness

- (1) ANNEALING
- (2) CRYSTALLIZING
- (3) DRAWING TIGER
- (4) FURNACING TIGER
- (5) TEMPERING
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- (7) MELTING BRASS AND BARRY METALS

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CHAMPION"

"We have been using Non-Gran in a heavy duty bearing on our machine, adopting it after we had tried out several other bronzes as well as white metal bearings and have found NON-GRAN to give better wearing quality than any other bearing material."

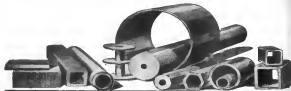
SO wrote one of America's most prominent manufacturers of printing machinery.

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NON-GRAN
BEARING BRONZE

American Bronze Corporation
Berwyn Pennsylvania

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REG. U. S. PAT. OFF.



These Sheets, Tubes and Rods Save Moulding

SOME of the most complex electrical and mechanical articles have been machined or punched from the many varied stock sizes of Bakelite Sheet, Tube and Rod.

These convenient forms of Bakelite afford the manufacturer who does not wish to incur the expense of making special moulds an opportunity to take advantage of the superior insulating and physical properties and easy machining qualities of Bakelite at a very nominal cost.

Bakelite Sheet, Tube and Rod possesses even greater mechanical and dielectric strength than Bakelite Moulded Insulation. It is unaffected by water, steam, oils, solvents and most chemicals and will not bloom or swell.

Orders for these forms of Bakelite should be directed to either the

CONTINENTAL FIBRE COMPANY
Newark, Del.

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East Pittsburgh, Pa.

The GENERAL BAKELITE COMPANY, 3 Rector Street, New York, welcomes inquiries from manufacturers and maintains a research laboratory for the working out of new applications, including those pertaining to flying machines.

Fires Two Plugs in Each Cylinder with Perfect Synchronism

PHILBRIN

"Triplex Double" Ignition

Important Advantages

- 1—Three separate systems of spark ignition
- 2—Two independent Single Spark Systems.
- 3—One High Frequency or Emergency System
- 4—Current to both distributors fed through one Contact Maker
- 5—Practical impossibility of ignition failure
- 6—Efficiency of the Philbrin Armored Condenser

IF designing this system for double ignition engines, particular attention was given to the problem of spark synchronization and security against ignition failure. The problem's solution is found in the system's simplicity as described below.

1. The Philbrin Triplex Double Ignition embodies three separate systems—two Single Spark systems, which can be used interchangeably, and one High Frequency or Emergency system.

2. Each Single Spark system is utilized at all engine speeds and under highest compression. It over-rides the efficiency in the design of the Philbrin Contact Maker which provides for thorough saturation of the coil and an instantaneous break.

3. The High Frequency system delivers a "shower of sparks" to each cylinder in its regular firing order and sets the same pair of distributors in the Single Spark system. Quick and easy starting are insured by this "shower of sparks" which will fire on ignitable mixture and complete ignition combustion under adverse conditions—such as a flooded cylinder or a carburetor out of adjustment, poor fuel and choked cylinders.

4. Perfect spark synchronization is secured in both the Single Spark and High Frequency systems by feeding the current to both distributors through one Contact Maker. There are two Contact Makers—one located in each distributor—but only one current at a time. A selective switch makes either one available.

5. The combination of the three systems and the simplicity of the Philbrin Contact Maker makes repairs practically impossible. The Contact Maker operates perfectly without lag and has ample capacity for any speed the engine can attain.

6. The Philbrin Armored Condenser is completely immune to water (even when submerged in sea water), moisture, salt-water charges, alkalis or other electrolytic conditions. We do not know of a single instance where a Philbrin Condenser, tested by us, has broken down.

This type of system for airplanes can be made of aluminum, thus rendering the entire unit extremely light.

This reproduction shows the Contact Maker and Double Distributor of the Philbrin Armored Condenser, double ignition system for airplane engines.



PHILIPS-BRUNTON COMPANY

331 South Second Street
Kansas City, Mo.

I Am Public Opinion



All men fear me!

I declare that Uncle Sam shall not go to his knees to beg you to buy his bonds. That is no position for a fighting man. But if you have the money to buy, and do not buy, I will make this No Man's Land for you!

I will judge you not by an allegiance expressed in mere words.

I will judge you not by your mad cheers as our boys march away to whatever fate may have in store for them.

I will judge you not by the warmth of the tears you shed over the lots of the dead and the injured that come to us from time to time.

I will judge you not by your uncovered head and solemn mien as our trained in battle return to our shores for loving care.

But, as wise as I am just, I will judge you by the material aid you give to the fighting men who are facing death that you may live and move and have your being in a world made safe.

I warn you—don't talk patriotism ever here, unless your money is talking victory Over There.

I am Public Opinion!

As I judge, all men stand or fall!

Buy U. S. Gov't Bonds Fourth Liberty Loan

Countdown through Division of Advertising



Liberty Bonds are Public Information

THE NORMA COMPANY OF AMERICA
1770 BROADWAY NEW YORK

OCTOBER 1, 1918

AVIATION AND AERONAUTICAL ENGINEERING

VOL. V, NO. 5

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WASHINGTON OFFICE, BRIDGEWAY BUILDING

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ISSUED ON THE FIRST AND FIFTEENTH OF EACH MONTH. POSTAGE PAID BY THE GARDNER-MOFFAT COMPANY, INC. AT NEW YORK, N. Y., UNDER ACT OF MARCH 3, 1879.



A Soldier Facing Death For You

Somewhere in France today, at this very moment, there is a soldier looking straight into the face of death.

He is doing this for you.

By night and day, in storm, in rain, in cold and snow, facing a hundred deaths he never hesitates a minute but does his duty without a thought of hesitation and without a thought of reward.

What are you doing for him today?

When you think of that man don't you wish to do something to prove that you appreciate what he is doing for you?

Of course you do. Then act on your desire and buy Liberty Bonds which will help to safeguard him and to bring him back home.

After you have bought all you can sell your friends to do the same.

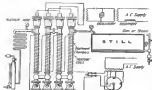
BUY LIBERTY BONDS TODAY
ANY BANK WILL HELP YOU

THIS SPACE CONTRIBUTED TO WINNING THE WAR BY
WYMAN-GORDON COMPANY, WORCESTER, MASS.

Synthetic Gasoline

The rapid increase in the world's aircraft, and in the many other machines requiring gasoline as motor power, are creating a demand for this fuel which is not being met by the natural supply. The fact, however, that gasoline is not being produced in sufficient quantities to meet the demand, is not a serious one, as it is not a scarce commodity. Other substances in great demand have been satisfactorily made by artificial means, and it is believed that our chemists have found the means of producing a great volume of gasoline from other substances in a great volume, but the process is not yet perfected. The fact, however, that our chemists have found the means of producing a great volume of gasoline from other substances in a great volume, but the process is not yet perfected.

Crude petroleum, as obtained from the wells, is split up by distillation into various grades of oil, and the lightest product used for fuel in engines is known as kerosene. It is a mixture of hydrocarbons, and its boiling point is about 300 to 350 deg. The lighter grades with boiling points are separated from the heavier by the use of a vacuum still, and the gasoline is then separated from the kerosene by the use of a vacuum still.



STILL FOR PRODUCING SYNTHETIC GASOLINE

which are generally given off by wells, and are called natural gas, are condensed and used for the same purpose. The lighter the gasoline, the more easily it will volatilize in air at ordinary temperatures, and this readily forms an explosive mixture with air for internal combustion engines.

Light grade gasoline requires appreciably less heat for its conversion into a gaseous state than heavier fuel, and owing to its low latent heat of vaporization the heat required for the formation of a given volume of gasoline is reduced, and less attention must be given to the carburetor. It is well known that owing to the very great demand for gasoline the temperature range of the carburetor has been increased, and now much heavier grades of the fuel have to be used in engines. When synthetic gasoline is produced on a commercial scale, this is the point of obtaining a sufficient supply of the light grade fuel, which will be a great advantage for the same reason.

From a chemical standpoint gasoline mainly consists of the elements carbon and hydrogen, and as it is a pure chemical compound, but a mixture of a large number of compounds, its properties cannot be definitely stated, as they vary in each different grade. The most common grades of gasoline are kerosene (C₁₂H₂₆), gasoline (C₁₀H₂₂), and naphtha (C₁₀H₁₈). These compounds have no chemical difference, and are all made up of the same elements, and are all made up of the same elements, and are all made up of the same elements.

Natural gas is composed largely of methane (CH₄), which occupies a place at the beginning of the series of hydrocarbon compounds, and is the simplest of the gasoline group. The burning of this when combined with heavier hydrocarbons to obtain an increased quantity of light fuel is not yet perfected. Now if sufficient methane, or hydrogen gas, could be obtained, it would be possible to produce a great volume of gasoline from other substances in a great volume, but the process is not yet perfected.

Already it is known that the increase in percentage of hydrogen necessary to convert some of the heavier hydrocarbons into the lighter and lower boiling point compounds is sufficient to make a great volume of gasoline from other substances in a great volume, but the process is not yet perfected.

very small. One of the earliest experiments along this line demonstrated that this was possible by increasing the boiling point of a specific gravity of 0.82 and a density of 0.715 at 60 deg. The apparatus was very simple, as the still was made of a piece of brass tubing, with each end closed by a screw cap.

The gas and oil vapors were subjected to high voltage, the voltage being applied to the electrodes made of metal. The gas and oil vapors were subjected to high voltage, the voltage being applied to the electrodes made of metal. The gas and oil vapors were subjected to high voltage, the voltage being applied to the electrodes made of metal. The gas and oil vapors were subjected to high voltage, the voltage being applied to the electrodes made of metal.

This experiment was carried out at high pressures and temperatures, but later on with larger and better apparatus proved that a very high frequency was necessary to obtain the desired results, and that increasing the frequency would make the specific gravity and lower the vapor pressure. The gas and oil vapors were subjected to high voltage, the voltage being applied to the electrodes made of metal. The gas and oil vapors were subjected to high voltage, the voltage being applied to the electrodes made of metal.

In order to avoid the difficulties due to the use of high pressures, attempts were made to produce a synthetic gasoline under atmospheric pressure, and it was found that this was possible. The gas and oil vapors were subjected to high voltage, the voltage being applied to the electrodes made of metal. The gas and oil vapors were subjected to high voltage, the voltage being applied to the electrodes made of metal.

The success of these experiments led to the construction of a larger plant, which embodied a step-up transformer for 100 to 30,000-100,000 volts, and had a capacity of producing about 1,000 barrels of oil every 24 hours. The gas and oil vapors were subjected to high voltage, the voltage being applied to the electrodes made of metal. The gas and oil vapors were subjected to high voltage, the voltage being applied to the electrodes made of metal.

Book Review

Dictionary of Aviation, by Robert M. Foster. (The McGraw-Hill Co., New York, 1922, pp. 32.)

At the present time, the aviation industry is in a state of rapid growth, and it is not surprising that there is a great deal of interest in the subject. The Dictionary of Aviation, by Robert M. Foster, is a book which is well worth a read. It is a book which is well worth a read. It is a book which is well worth a read.

The author is a man who is well known in the aviation world, and his book is a book which is well worth a read. It is a book which is well worth a read. It is a book which is well worth a read. It is a book which is well worth a read. It is a book which is well worth a read.

Digest of the Foreign Aeronautical Press

The Aeroplane, Aug. 24, 1918.

Work of the R. A. F. in the Third Battle of the Somme.—The Royal Air Force with the British army in France played a most important part in the recent successes on the Somme.

The destruction by H. A. F. fighting pilots of large numbers of enemy airplanes made the way clear for wholesale attacks by leveling airplanes upon German industry, gas and transport, and disrupting and impeding what might otherwise have been an orderly retreat.

Two complete advanced aeroplanes were captured, at one

The Air Service will shortly become regular and daily, and a Paris-New service point service may soon be started with a possible continuation to Rome. The airplanes and air machines which, though quite efficient for the service, are not at this time for military use on the front.

The pilots are also men who are no longer fit for service at the front. For instance, one is a sergeant-major, who has already been five times wounded in action, and another is a sergeant who escaped from Germany, where he was a prisoner of war. When the aerial postal service becomes regular, the rates



FRENCH FARMAN AIRPLANE, USED BY THE FRENCH BY NAME. THIS MACHINE IS A LATEST TWO-TRUCK, FIVE-ENGINE TYPE WITH TWO 120 HP. HISPANO-SUIZA ENGINES.

Control Air Service Service

of which was found a five-engine bombing airplane, a type which has been in service for some time, but not very much in use.

At the commencement of the advance on August 8 all the German aeroplanes in the sector attacked were heavily bombed, and, as a result, the German forces had a single German aeroplane left in the sector.

Subsequently, the German aeroplanes were attacked and a number destroyed by bombs, which resulted in great destruction of some of the German aeroplanes. The German aeroplanes, which were so numerous as to be used in the greatest skill on the part of the pilots to avoid collisions, had special attention to the crews of anti-aircraft guns, to keep them, below them and out of view.

The Aeroplane, Aug. 21, 1918.

French Aerial Mail Service Established.—A postal service by air was started on August 15 for the first time in France between Paris and St. Nazaire. Airplanes, carrying mail, left the Bourget Aerodrome, near Paris, shortly after 10 a.m., and on the 16th the two machines, after having had an overnight stop, reached St. Nazaire at 8.30 a.m., after a stoppage at Le Mans. The total distance from Paris to St. Nazaire is over 300 miles.

charge for letters by it will be 70 cent per letter. Letters before by aerial post are at present wrapped in a narrow and hard bearing the words, "By airplane." Very soon the aerial postal service will be working regularly, and a special stamp will be used bearing the effigy of the late Captain Guynemer.

Flight, Aug. 25, 1918.

Aerial Mail Service in Morocco.—In connection with the acquisition of aerial mail in France it is pointed out that for over a year airplanes have been officially used to transport mail between the various posts. Each sub-office has a machine at its disposal, the machine carrying a service between the chief town of the sub-office and distant airports. They carry the mail, below them and out of view. Finally they are at various points are kept in the air. All these airplanes are carried on a regular basis, with- out exception, with the aerial service of the bombing, photographic and postal squadrons. It is suggested that it is likely it might be possible, by means of an agreement between the Moroccan Government and the Government of France, to establish aerial postal communication with the great North African colony, which would benefit not less than Morocco by its route to Lome and Angora than around.

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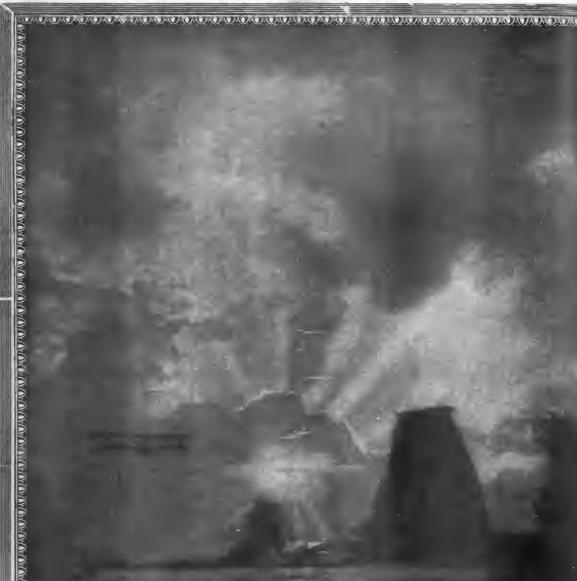
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